A critical appraisal of "The effect of ankle bracing on knee kinetics and kinematics during volleyball-specific tasks"

By

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Abstract

The research question being researched is "For high school and college volleyball players, what is the effect of wearing ankle braces on ACL tears as opposed to not wearing ankle braces?" Out of 3 different search databases, only one article was a good match for the research question. *The effect of ankle bracing on knee kinetics and kinematics during volleyball-specific tasks*; the study done in Australia was not comprehensive and could have had a multitude of improvements. The study did include volleyball players, ankle braces, and knee injury relations and therefore answered the question. The study only included professional or college athletes and did not include high school players. The study also lacked the forces on the ACL, but did study knee shear forces. Some of the citations listed by the researchers were from the early 1970s and are not recent enough to trust. Other limitations of this study include minimal directions of shear forces on the knee, not enough athletes, and limited outcome measures. No one was blind in the study and every participant underwent the control and variable experiment. In conclusion, there should be further study done in order to understand if ankle braces hurt or help the knee when performing volleyball specific tasks.

Key words

Volleyball, Shear forces, ankle braces, knee kinetics, range of motion, limitations

Introduction

I chose this article for critical appraisal because it was an experimental research article. The research was done by T. West and A. Campbell from the Curtin Health Innovation Research Institute in Perth, Australia. There is no indication that the participants were randomly selected or that it was a blind study. The participants went through the same trials and warm ups. The outcome measures were all verified and backed up with citations. Limitations of the study were that the participants only went through a single data collection study, there were only 15 volleyball players, they participants were not diversified, and all the every direction of force on the knee were not tested. Another limitation is that the trials were only accepted when the push off for cutting was at a 90 degree angle. This does not provide actual game time movements, when the players do not think about the degree of their cutting.

Methods

The data bases I used to find articles about the effect of ankle braces on knee injuries in volleyball players were NCBI, EBSCO, and PUBMED all from the ASU website. The keywords that I used to find relevant articles were volleyball, ankle braces, and knee injuries. The limits placed on my search were full text articles, peer reviewed, language English, articles from 2000-2018. I used full text so that I could read the methods and results clearly in order to see what exactly was tested by the researches. I chose peer reviewed to make sure that the source was a credible source. I chose English because I only speak English fluently. I set limits on the dates in order to narrow my research down and make sure that the research was current. I did not use any exclusions criteria because I did not want to narrow my search down too much. I did, however, use inclusions criteria of ankle braces and knee pain because I needed to find any research on the correlation of the two. I also included volleyball players, but there wasn't much research on that

population so I widened my search to athletes. Without narrowing down my research, I got 525,861 hits on EBSCO host. After using my limits, I narrowed down the articles to 40,252.

The article chosen is about was brought about because many volleyball players wear ankle braces for support of the ankle, but there are not many known studies on the effect of wearing ankle braces on the knee. Volleyball players are susceptible to knee injuries because of jumping and cutting. The authors of this study are T. west, L. Ng, and A. Campbell. They conducted the study at the School of Physiotherapy and Exercise Science and Curtin Health Innovation Research Institute in Perth, Australia. The article was published on August 21, 2013 to the Scandinavian Journal of Medicine and Science in Sports by John Wiley & Sons Ltd.

Summary of the study

The study was conducted to understand the knee kinetics and kinematics of volleyball players when wearing ankle braces. They hypothesized greater range of motion at the knee joint and greater shear forces on the knee, if the volleyball players wore ankle braces. The researchers chose 15 college or elite volleyball players who had not musculoskeletal injuries. The volleyball players went through a controlled warm up and then started their trials. They first completed a max height jump and were measured for height and arm length in order to determine where the ball would be placed for hitting. The players each went through a series of fundamental volleyball skills: running, blocking straight up and down, landing on one foot, and cutting after blocking. The players all conducted the study braced with the Active Ankle T2, and not braced. The outcome measures were measured by force plate and 14 camera Vicon. These helped to determine the shear forces on the knee and the range of motion of the knee during the volleyball-specific tests. The tests concluded that the ankle braces did not impact the range of the motion of

the knee, but in some instances, slightly reduced the amount of shear lateral and medial force loading in the knee joint in volleyball players. The number of participants was small and the was only limited to lateral and medial shear forces. Further study should be conducted.

Results (9 paragraphs)

Appraisal of the study introduction

The introduction is highly comprehensive, including all background on the effects of volleyball on ankles and knees, ankle brace type and effect, hypothesis, incidence of injuries and the purpose of the study. The introduction does a good job at explaining about the reason for the type of ankle braces they use.

The introduction, however is not well marked and the reader is unsure weather data collection is supposed to be its own section or part of the introduction. If it is its own part, the introduction lacks the basic explanation of how the testing will be conducted. The article was published in 2013, but some of the sources were from 1973 and the 1990s. These articles may be outdated for this current of research. The article from 1973 is about the effectiveness of support to prevent ankle sprains, and although this may be relevant for ankle braces, this is not what the study is looking at. The introduction is clear, but the weakness is that some of the articles are too old to trust and the introduction doesn't state what outcome measures will be used.

Appraisal of the study methods

There were many strengths to the methods section of this research. This study is a quasi experimental design because the participants are not randomly assigned to wear ankle braces or not. All of the participants wear the ankle braces and don't wear the ankle braces during their trials. This a cross sectional study because the participants "attended a single data collection". There were 15 female

volleyball players who were current state or national level indoor volleyball players. There was no attrition over the course of the study because it was single study. The subjects were all treated the same way. They went through a "standardized, typical pre-match warm up". Then max jump was taken from the best of 3 jumps. They all performed a series of volleyball task with no brace and with a brace. The braced and non-braced conditions were randomized by Microsoft excel. SPSS was used to performed a t test. This is familiar to me and shows that the data is significant within the methods section. This is generally known as a reliable database.

Weaknesses include the following list. There was no indication that anyone was blinded. The players were hand picked and no one was blind to the ankle braces during the trials.. No blinding of the group was concealed from subjects. Clinicians were not blinded or masked either. Everyone was aware of everything throughout the experiment. A limitation is a person who doesn't know the sport of volleyball may not know exactly what to do and how to read outcome measures. Another limitation is that only one direction is tested for cutting on the knee. This is not what happens in real life and may create false data for ankle support and knee kinetics and kinematics.

Appraisal of the study results

The authors only discussed what the results were from certain movements. The graphs are very neat, easy to read and organized. The explanations are formatted above the tables, which is correct, and they explain where the information came from According to the chart, the lateral shear forces on the knee when performing all lateral movements and a medial shear force is less with push off after blocking is significantly less with ankle braces on.

The results section is short and not clear enough. There were hardly any details on the results and they said refer to table too much. The results were presented in the same order as the hypotheses were written, but was not parallel with the methods section. The methods described study in terms of the

movements, whereas the results described the study in terms of the direction of the shear forces on the knee In this article there were two hypotheses written in the introduction and the results section covered each of these hypotheses. The authors left out all outcome measures from the results section. Based on my current knowledge these differences of shear forces are not clinically meaningful. .3 difference of N/kg is not that much less of forces acting on the knee. There was no MCID mentioned before analyzing the data nor was the NNT.

Appraisal of the study discussion

Strengths of the discussion include the following: The authors suggest that future studies should be done on different ranges of motion with ankle braces, prospective and between group studies should be completed to test more people. The authors suggest that his is clinically important because shear forces have been known to increase joint pain and injuries later on in the knee. Valgus forces have been linked to patellar tendinopathy in the knee for volleyball players along with knee osteoarthritis. If ankle braces do decreases shear forces on the knee, this could be preventative to future knee injuries in volleyball players

Weakness of this study include the study was limited to 15 elite female ankle flexion and plantar flexion and did not include inversion/eversion, abduction/adduction, and hip kinetics. The authors did not included EMG data to study shear forces and there was only shear forces and there was only one competition level tested. The conclusions are reflective of the results, but there were repetitive conclusions stated.

Discussion

The clinical significance of this study is to show whether or not athletes should wear ankle braces to help their knee pain. If ankle braces were to worsen shear forces on the knee, the physical therapists should warn athletes about the implications of wearing the ankle braces.

However, according to the study, there is hardly any significant difference on knee shear forces and could possibly reduce the forces on the knee. Further study must be conducted to draw the latter conclusion. This research article tries to answer the research question, but there was not enough clinical significance of results to completely use as the answer to the question.

According to the citations of the article, there are beneficial uses for ankle braces in reducing ankle sprains. Therefore, there are no negatives to wearing the ankle braces for the ankle. There was no significant difference of forces on the knee when the players wore the ankle braces, not showing whether or not the ankle braces make injuring the knee easier. Because there have not been studies showing that ankle braces make knee injuries more likely, there is not a reason to not use the brace. However, there was not a large population studied, and there should be further studies before trusting this conclusion.

If there were a larger population, and more movements on the knee were conducted to see what happens to shear forces on the knee with ankle braces and there was a larger change in shear forces for the better, then there would be more argument in favor of using this appraised intervention. However, if you do increase population and movement types and the shear forces greatly raised, then there would be argument to not wear ankle braces if you are experiencing knee problems.

In conclusion, there is not enough evidence to confidently state this paper is valid and should be used for patients or athletes. There should be future studied with larger populations with adding more directions of movement to determine if ankle braces are better for the knee. This study does show that there was no harm when performing lateral movements in volleyball specific tasks and could be used when performing those specific tasks.

Research Article Citation

West, T., Ng, L., & Campbell, A. (2013). The effect of ankle bracing on knee kinetics and kinematics during volleyball-specific tasks. *Scandinavian Journal of Medicine & Science in Sports, 24(6), 958-963. Doi:10.111/sms.12130*